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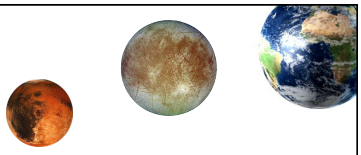

ES 2001G: Exploring the Planets
*An Introduction to Planetary Science*

**Lecture 01:**
**Mercury**

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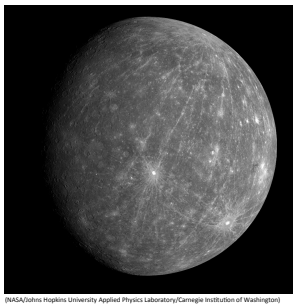
## Mercury



- 1st planet from the sun
- Smallest planet in the Solar System
- Heavily cratered surface
- No atmosphere
- No satellites

(NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington)

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## History

Discovery
- Known by the Ancients

Roman mythology
- Named after the winged messenger of the gods
- Also the god of thievery, commerce, and travel
- Greek counterpart: Hermes

(greek-mythology-pantheon.com)

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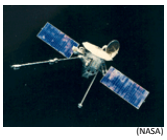
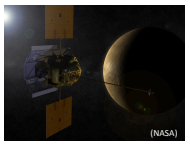
## Exploration

Mariner 10 (1973 – 1975)
- Made 3 flybys
- Goals: Study atmosphere, surface, and physical characteristics
- Mapped 40–45% of the surface


(NASA)

MESSENGER (MErcury Surface, Space ENvironment, GEochemistry and Ranging)
- Launch: Aug. 3, 2004
- Goals: Map surface composition, and study magnetic field and interior structure
- Will crash into Mercury in 2015 to end mission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## Fact Sheet


(NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington)

| | |
|---|---|
| Distance from Sun | 5.791 x $10^7$ km (0.387 AU) |
| Radius | 2,439.7 km |
| Mass | 3.301 x $10^{23}$ kg |
| Density | 5.427 g/$cm^3$ |
| Surface gravity | 3.7 m/$s^2$ |
| Escape velocity | 4,250 m/s |
| Axial tilt | 0° |
| Rotation period | 58.646 Earth days |
| Orbital period | 87.97 Earth days |
| Surface temp. | 100 – 700 K (-173 – 427° C) |

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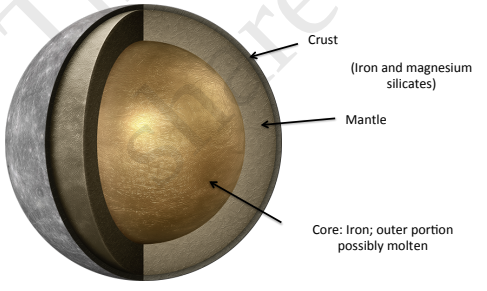
## Internal structure




(solarsystemscope.com/nexus/resources)

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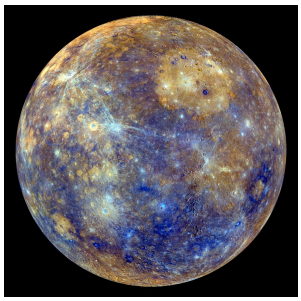
## Surface composition



(NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington)

Colors enhance chemical, mineralogical, and physical differences between rocks

- Light blue/white: young crater rays
- Darker blues: Mercury's crust (low-reflectance material)
- Yellow/tan: volcanic plains

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## Cratered terrain and intercrater plains

- Heavily cratered regions
- Broad areas of gently rolling plains, impact craters, and basins
- Most widespread terrain

(NASA/JPL)

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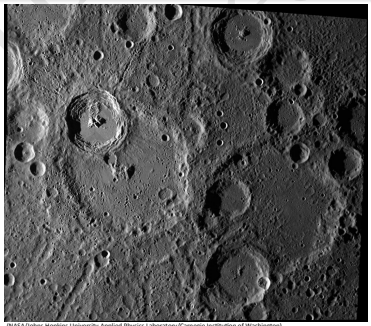
## Cratered terrain



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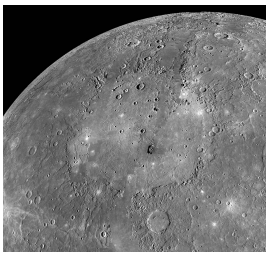
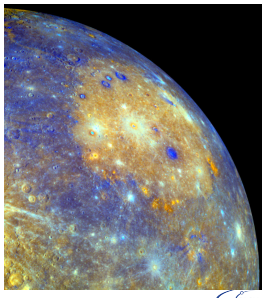
## Caloris Basin

Multiring basin ~1,300 km diameter





(NASA)

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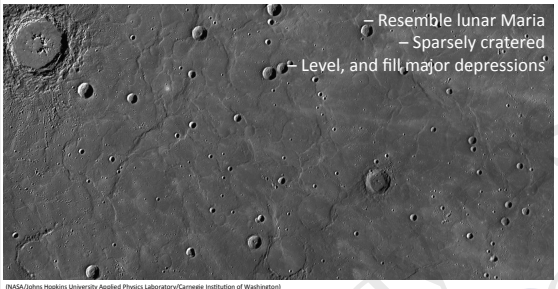
## Smooth plains



– Resemble lunar Maria
– Sparsely cratered
– Level, and fill major depressions

(NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington)

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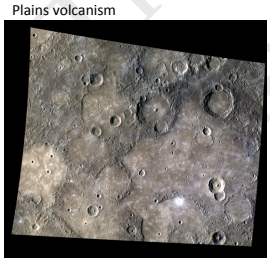
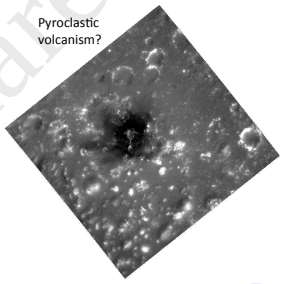
## Volcanism

Plains volcanism



Pyroclastic volcanism?



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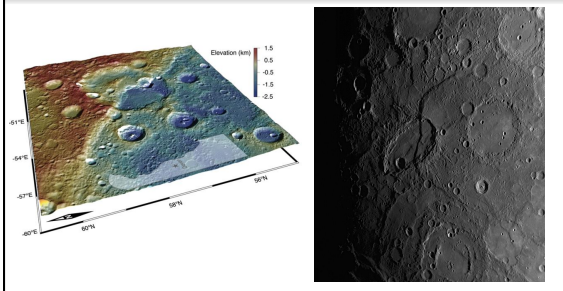
## Tectonic deformation

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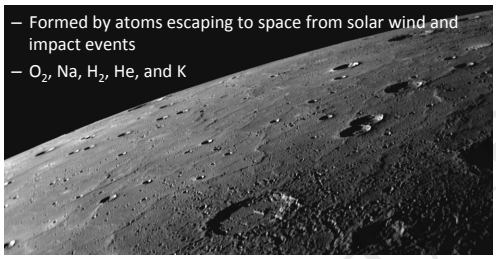
## No atmosphere

…but has an exosphere

- Formed by atoms escaping to space from solar wind and impact events
- $O_2$, Na, $H_2$, He, and K



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